The Role of Communication and Facilitation for CSCL@work

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Abstract This chapter deals with the role of communication and facilitation for CSCL at work. The difficulty of gaining hands on experience doing group work with distance education makes high quality and organization in technologically mediated communication vital. This chapter examines the role that facilitators can play in raising the quality of communication in CSCL at work. Based on related work on the facilitation of face-to-face and computer-supported communication a model of triadic communication is presented that focuses on the tasks of a facilitator. Triadic communication means communication with three roles (communicator, recipient, and facilitator). For these tasks technical support within a CSCL-system are developed and analyzed in two cases studies; one study dealing with the facilitation of asynchronous computer-supported learning and the other study with the facilitation of synchronous settings. Results of the studies concern technical features as well as facilitation strategies. From the results generic design principles for the facilitation of communication within CSCL at the workplace are derived and integrated on the model of triadic communication.

Keywords Communication * Facilitation * Collaboration * Computer support

1. Introduction

Coordination is more difficult for groups working on complex tasks with dependencies between members that emerge while work is taking place. CSCW research focuses on understanding group work on complex tasks demonstrates that workers often need information about the task, and to learn new skills in order to perform the task (Schmidt, 2011, Randall & Salembier, 2010). Such skill development typically occurs during the course of performing work, and is an exemplar of informal learning using Computer Supported Collaborative Learning in the workplace (CSCL at work) approaches.

Collaborative learning is framed by the constructivist approach to learning, within which learning is viewed as an active process of constructing rather than acquiring knowledge (Duffy & Cunningham, 1996). The active role of the learner is a central characteristic of collaborative learning (Koschmann, 1996). This implies
that participants learn from each other by actively co-constructing knowledge (Stahl, 2002). This active co-construction of knowledge based on the theory of constructivism is the “motivating theory in CSCL literature” (Suthers, 2006).

Computer-supported collaborative learning can include temporally and physically distributed users. In these cases learning mainly focuses on communication, since direct experience of a situation and learning by observation are mostly inapplicable in distance learning processes. Most CSCL research views communication as a precondition for CSCL (see for example Pea, 1996 or Stahl, 2002).

Within an organization there are two types of CSCL at work. Type One occurs when there is an expert at the workplace who knows an answer to a problem and can help the learner. Type Two, which is the focus of a number of chapters in this book and a key difference between CSCL at work and traditional knowledge management, occurs when the answer to a problem is not known and new knowledge has to be co-constructed within the organization. This chapter focuses on the second type.

Type One: This type of CSCL at work is most similar to traditional knowledge management approaches. The main distinction is the use of computer support for both facilitation of learning activities and retrieval of information. Type One approaches often deal with a combination of storing content and enabling communication within one system (see e.g. Kienle, 2006).

One problem in this dimension is to find an appropriate expert. This problem was for example addressed in the project Advanced Process-Oriented Self-Directed Learning Environment (APOSDE, partially funded under the 6th framework program (FP6) for R&D of the European Commission within the Information Society Technologies (IST) work program 2004).

In this project an approach to discover collaboration partners and adequate advising experts in a workplace-embedded CSCL-system was introduced (Lokaiczyk et al., 2007). The following steps towards a successful collaboration initiation are proposed.

In the beginning, the user’s current process task needs to be identified. Taking into account the knowledge about the current process, the availability of experts as well as organizational and social distance, relevant experts regarding the actual work task of the learner are pre-selected. The selection of matching collaboration partner and learning resources is calculated in a server component, the platform. The platform is also used to store extensive user profiles, which contain user history, task dealt with and competencies acquired. But also the availability of potential experts and the current work situation is kept there.

Depending on the pre-selection and users’ preferences, the potential collaboration partners are displayed in an expert list. Directly from a sidebar, the user is able to initiate collaboration with the desired expert. Both collaboration partners join a common collaboration room, where context information about the
task of the learner etc. are presented and they can exchange text messages und collaboratively work on or discuss about certain documents and presentations. Consequently, the invited expert is able to get quickly an idea of the problem of the learner and can provide help uncomplicatedly. That way, the learner is able to initiate beneficial collaborations, whose transcripts are used to enhance the existing knowledge base of learning documents.

**Type Two:** When knowledge does not exist in an organization, it needs to be created within it. As Fischer (this volume) points out, this involves organizational infrastructure to help people to solve problems in cases when the knowledge required does not already exist in the organization. This is like constructing new knowledge but at both the institutional and individual levels. It is a joint process involving several learners. In work reported here this involves not just the technical system where CSCL at work is supported, but human facilitators who support and inspire the communication processes for knowledge construction (also see the chapter by Prilla & Herrmann, in this volume, titled *Collaborative Reflection at Work* for a description of different roles like reflection helper). The need to support communication in CSCL processes changes the role of the moderator or facilitator\(^1\) (Hansen et al. 1999, Kienle 2006) which needs to be supported by appropriate functionalities within the CSCL-system in order to achieve different tasks successfully.

The approach of designing tasks of the facilitator and functionalities of the technical system relate to cluster B in the CSCL at work framework (see introduction, this volume) and addresses two of the questions posed by Fischer (this volume):

- **Question 4** – How can media (technical system) facilitate the dialog toward reflective communities to cope with systematic problems? To what extent do we need a facilitator who fosters learning communities at work?
- **Question 5** – How do we create and design socio-technical systems for learning when the answer to the problem is not known?

The rest of this chapter is organized as follows: section 2 deals with the theoretical background on facilitation of learning in face-to-face and online settings

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\(^1\) There is sometimes confusion about the wording for this role: in English literature the term “facilitator” is dominant, in German literature the term “Moderator” is used. In this chapter the terms facilitator and moderator are used as synonyms.
(2.1) and describes a model that systematizes the activities of a facilitator in computer supported setting (2.2). Section 3 reports two cases studies illustrating the tasks of a facilitator and technical support for facilitation by using an explicitly socio-technical design. One case is related to an asynchronous setting (3.1), the other one to a synchronous setting (3.2). From these studies a set of principles for the design of computer support for learning facilitation in a CSCL at work context is refined. I also reflect on the findings related to the tasks of a facilitator in the model of communication we describe in the cases (section 4). The chapter ends with a discussion of topics for further research.

2. Theoretical background

2.1 Facilitation in face-to-face and online settings

Moderating discussion in face-to-face settings is widely discussed in the literature (Klebert et al. 2000). However, it remains unclear how collaborative learning processes are best moderated and how this moderation can most effectively be supported within a technical system. Friedrich et al. (1999) emphasise that the direct transfer of methods used in face-to-face situations to computer supported situations is not suitable. Furthermore new methods have to be developed since communication rituals and procedures developed on the fly in face-to-face situations have to be facilitated explicitly in computer supported situations (Friedrich et al., 1999).

Most of the present literature on facilitation in computer-supported settings addresses the primary concerns of practitioners in the field, e.g. (Salmon, 2011, Collison et al., 2000). This body of work describes a moderators’ duties and responsibilities in computer supported situations as being similar to activities well known from face-to-face situations: “The best e-moderators undertake the ‘weaving’: they pull together the participants’ contributions by, for example collecting up statements and relating them to concepts and theories from the course. They enable development of ideas through discussion and collaboration. They summarise from time to time, span wide-ranging views and provide new topics when discussions go of track.” (Salmon, 2011)

Up to now little and sometimes contradictory advice can be found concerning the relation between the facilitation of computer-supported collaborative learning processes and the well-known traditional techniques of facilitating face-to-face meetings. Friedrich et al. (1999) conducted a much-cited study on asynchronous moderation techniques, comparing two different methods for initiating a discussion (Friedrich et al., 1999). One relied on a a) neutral opening statement, while the other made use of b) problem-centric, curiosity-arousing wording when initially characterizing the discussions’ objective. They confirmed the assumption that the latter type (b) discussion initiation results in an increased number of contributions from discussion participants. Furthermore, the fewer statements by moderators to
the discussion, the greater the number of participant statements. Thus, one result is that the moderation style of the facilitator directly influences participant engagement in computer mediated settings.

In addition, it seems necessary to develop new strategies when moderating computer supported communication processes (although the tasks may be similar): “Moderators must learn new strategies that are appropriate to the online venue, and, through continued practice, study the range of their effects (...) The goal is to help learners as their own thinking evolves” (Collison et al. 2000). The goal of this chapter is to mine these activities and provide appropriate technical support to users.

The support of synchronous facilitation is often related to “reducing chat confusion” (see e.g. Thirunarayanan & Perez-Prado, 2007). Chat confusion occurs when discussion threads are developed in parallel and problems arise relating incoming contributions to the appropriate discussion. To solve that problem, Piementel et al. (2005) propose a system called Mediated Chat that includes conversation techniques, e.g. a circular contribution where users are organized in a circular queue. But the evaluation showed that such techniques are not flexible enough and do not avoid interruptions of discussion threads and chat confusion (Piementel et al., 2005).

A more restrictive way is followed in the Instructor Controlled Chat System (ICCS) (Thirunarayanan & Perez-Prado, 2007). Here the facilitator controls the discussion in the same way as in the asynchronous applications: all contributions are sent to the facilitator and he decides whether and when the contribution is published to the others. Problems known from asynchronous settings are strengthen in the synchronous situation because the facilitator has to analyze all incoming contributions very rapidly: “The rapid nature of content analysis may also lead to the instructor leaving out some potentially interesting and significant comments or including some comments that do not add to the content of the discussion” (Thirunarayanan & Perez-Prado, 2007, p. 2).

To summarize, scientific publications dealing with the transfer and use of moderation techniques to computer supported settings is rare. The work reported here frames this gap more clearly, and begins to propose mechanisms for filling the gap in future research.

2.2 Tasks for the facilitation of computer-supported discursive learning

Generally speaking, tasks of a facilitator are a) the initiation of discussions, b) the guidance of the discussion process (includes asking appropriate questions to push students to think deeply on the learning content) and c) the stimulation of summary generated by the learners (Hmelo-Silver, 2002). This generic level Hmelo-Silver presented is applicable for various scenarios (various group sizes, aim of the learning process etc.).
The cases described here are related to groups of 8-15 participants discussing, developing and learning methods and content (that is not necessarily known in the group before). The participants were students working on a joint artifact (e.g. article or presentation). In the asynchronous case the participants are studies of computer science, in the synchronous case of educational science. The strategies of facilitation presented here can be used for formal as well as informal collaborative learning processes in both university or company settings.

Figure 1 shows a first version of systematizing the activities of the facilitator for CSCL. This model differentiates between synchronous and asynchronous settings for two reasons: (1) the technical functionalities are different in CSCL-systems supporting synchronous resp. asynchronous learning for the learner and in conclusion also for the facilitator and (2) with respect to the socio-technical design the functionalities and tasks are influenced mutually.

The model combines in the middle the tasks of the facilitator that build the facilitation strategy (elements with rounded corners) and functionalities of the technical system (rectangles). At the top the participating roles in facilitated discussion are shown: Communicators who add communicative contributions, recipients who read them and the facilitator who supports the communication. The role reversal indicates that participants (e.g. the students of the evaluated seminar) can take the role of the facilitator as well of a discussant (communicator or recipient). Concerning the roles it is important to emphasize that the participants should be aware of their actual role and its activities. The activities of the discussants are summarized in figure with the activity “dialogue” at the bottom of the framework. They are detailed in other publications (see e.g. Herrmann & Kienle Kienle, 2008).

Figure 1: The model of triadic communication
Pre-studies emphasized that processes of computer supported discursive learning and communication need an initial step of preparing and structuring the following process (Herrmann & Kienle, 2008). For synchronous situations a list of topics as a scaffold of the communication process is suggested. In asynchronous situations an overview of the activities the facilitator planned for the following communication is helpful.

During the communication process a facilitator initiates the discussions with starting theses. In the case studies (as described in the following section) no difference between an initiation by a question, a statement or an expression of opinion was found. However, to achieve a high participation in synchronous communication processes the facilitator has to draw the attention of the participants on the starting theses. A feature of floor control within the CSCL-system supporting synchronous communication is one way to direct the attention of the participants (see figure 4 below). Floor control means the technical supported management of contributors’ rights to “speak” – giving the floor is comparable to ask a participant to speak in the face-to-face settings.

Drawing the attention of the participants in synchronous situations is also important for the stimulation for further contributions and the final conclusion. In asynchronous situations instructions and deadlines what activity is requested by the participants lead to higher participation; in the case study described below other strategies of asynchronous facilitation are discussed.

For ongoing discussions the facilitator has the task of stimulating the discussion. In synchronous situations a change of the topic of discussion has a positive effect on the amount of contributions of the participants. In asynchronous situations hints on or highlighting of content in contributions of others should be given. The stimulation is often accompanied by activities of building bridges and coordination acts.

At the end discussions should be summarized. In order to increase the perception of these summaries facilitators should ensure that participants be aware of these summaries. From a technical point of view summaries should be placed in a prominent manner to emphasize their relevance. This especially became apparent during the analysis of fluent transitions between synchronous and asynchronous discussions (Kienle, 2009) and is also relevant for the integration of discussions and activities concerning material from digital libraries. For asynchronous settings it is important that the facilitator should include decisions made during the discussion. If necessary the facilitator makes decisions on his own – in contrast to face-to-face settings where the facilitator is not responsible for the content of decisions.

This model (see figure 1) is a tool for the requirements analysis of the computer support for triadic communication (triadic means communication with the three roles communicator, recipient and facilitator). It shows tasks for the facilitator that has to be supported within a CSCL-system. Functionalities for both synchronous
and asynchronous situations are developed and evaluated. They are described in the following section.

3. Case studies of computer-supported facilitation within CSCL

The guidance of computer supported collaborative learning by a facilitator is especially requested in processes of discursive learning where knowledge or statements of the participants has to be exchanged, combined, further discussed and even enhanced to new knowledge. In these processes the facilitator needs to structure and guide the communication intensive steps as shown in the section before.

For CSCL at the workplace such situations can be related for example to the development of new knowledge about methods (e.g. question of a department of sales and marketing “how can we improve our sales approach in order to increase the number of successful customer deals) as well as products (e.g. question of a product manager and his team “how can we improve our product to reach more accepted products”). By trend these situations address a definable group of participants that are “invited” for the discursive collaborative learning and communication process and guided by the facilitator.

The studies described in this section are university courses where groups of students (8-15 participants at each group) learn and discuss methods about the topic of collaboratively teaching and writing. The type of students was described above. The tutors in both studies gave initial material but also had the demand to develop new knowledge collaboratively. As far as I experienced during my work on intertwining knowledge management and CSCL (Kienle, 2006) the findings from these studies can be transferred to the scenario of CSCL at work.

The studies reported here used the CSCL-System KOLUMBUS 2 (for further information see Kienle, 2006, Herrmann & Kienle, 2008 or Kienle, 2009). KOLUMBUS 2 is a web-based CSCL-system that was developed by the University of Dortmund, Informatics & Society and the Ruhr University of Bochum, Information and Technology Management, both located in Germany. A former version was built to support the integration of asynchronous communication (in form of annotations) and joint work on learning material. The central feature is the segmentation of content into small units (called items), enabling the members to use and annotate the stored content in a very flexible manner. While communicative contributions have the form of annotations content is represented by text, pictures, binaries, links or annotations. Items of material can be inserted at the same hierarchical level of another item or on the next lower level. In this way users can build a hierarchy of their contributions. All existing functions (e.g. annotate, add, copy, and change) can be applied to every item. Discussions occur by annotating annotations. Basic concepts of that work are still part of the actual development.
3.1 Case study on computer-supported asynchronous facilitation

To support the task of the facilitator in asynchronous discussions technical features were realized based on the concept of role based access control (RBAC, see (Kienle & Ritterskamp, 2007) for details).

In a discussion thread, the facilitator’s contributions are highlighted with bold type, directing attention of the discussion’s participants to the facilitator’s inputs. This bold type of the facilitator’s statements also visually structure the discussion and reduce the necessity to reconstruct the course of a debate when working asynchronously. By this structuring, the initiation and leading over to the next phase as well as the summarization are respectively supported.

To promote contributions to an ongoing discussion two functionalities are offered: Emphasis can be placed on single contributions to a discussion by using a highlighting functionality: to label an element of a discussion thread, the facilitator can choose from a variety of background colors. Marking contributions in this way can be used, for example, to group similar contributions or to accentuate important arguments or to stress (intermediary) results of a discussion. There is no predefined meaning to the usage of different colors: it was intended that a user group develops the corresponding conventions without a predefined meaning. The discussion of the meaning assigned to the applied colors fosters the development of shared understanding of the applied functionalities.

System-internal links can be established if contributions that are semantically related to each other have to be interconnected. Establishing a relation between elements in such a way is especially reasonable if they deal with similar aspects of a topic but are distributed over several discussion threads and not directly connected to each other.
3.1.1 Setting and methods of the study

The aim of the study was both the development of a hypothesis concerning the methods of moderators’ intervention in asynchronous CSCL-processes, and detection of further requirements for the technical system and evaluation of the functionalities described above.

During a period of two months, the moderator facilitated a group of 12 students. This group had the concrete task to document their year’s work. Focus on this group led to a design different from conventional experimental studies in which new groups are formed to work on a virtual task for a short time. The task was divided into five steps. For each step, the moderator planned interventions in cooperation with the researcher (see Kienle & Ritterskamp, 2007 for details).

Quantitative data about the student group was gathered by logging all events in the CSCL-system. Furthermore, qualitative data was recorded on an audio file at group interviews conducted every two weeks.

The audio files of the moderator and group interviews were analyzed with respect to the methods of moderators’ interventions and their implications on group behavior as well as the technical support and its further improvement. The evaluation of the log files was conducted using a technical tool for analysis within the CSCL-system.

3.1.2 Results concerning different facilitation strategies

In face-to-face facilitation, it is emphasized that a facilitator only has to lead a communication process without any responsibility for the content of the discussion. In our study, we analyzed various facilitation strategies to get an answer for the question to what extend tasks of a facilitator can be transferred from face-to-face to computer-supported settings:

(1) Open questions without any instructions: At the beginning of the study, the facilitator asked open questions as is similarly the case with traditional facilitation in face-to-face groups. Students described obscurities concerning the (subjective) cognition of the progress in a discussion thread, especially whether a discussion was finished or not. With respect to this open-endedness, the students’ preference for explicit deadlines became apparent in their answers.

(2) Instruction, deadline and finalizing conclusion (one step towards more responsibility of the facilitator): In step 2, the facilitator used more instructional contributions which included deadlines. This strategy led to higher participation...
levels in the discussion. The analysis reveals for the first time that students worked at a rhythm similar to that given by the facilitator: on deadline days more contributions were added. Although participation was high, the discussions were not terminated, for example, in the form of an artefact that includes the discussion results. Students felt termination or finalizing should be done by the facilitator.

(3) Conclusions with decisions by the facilitator (full responsibility of the facilitator): In a third step, the facilitator intervened more than during previous steps. She did not only formulate more instructions which included deadlines, but terminated discussions. If some topics did not come to an end by the deadline, the facilitator decided to stop, and proposed a solution. Students confirmed that the progress of the process was achieved by the facilitator’s intervention. From these findings we conclude that the activity of summarizing discussions has an increased relevance in computer supported settings.

3.1.3 Results concerning the technical support of the facilitator’s tasks

Students affirmed that emphasizing a facilitator's statements by using bold fonts proved to be helpful in following the course of a discussion. Since the contributions of a facilitator often brought up a new topic and thus resulted in a new discussion thread, emphasizing them pointed out the structure of an extensive discussion more clearly. For instance, if two facilitator statements were displayed one below the other, topics thus far not discussed became rapidly apparent. Regarding the highlighting functionality, the facilitator emphasized that the highlighting of single words would be more appropriate than highlighting the whole item. In terms of the communication model and additional activities of a facilitator, this fine-grained highlighting supports the facilitator in directing attention to the topic of the contribution.

The facilitator proposed further functionalities for an improved support for activities typical to the facilitation of both face-to-face and computer supported discussions. Firstly, a facilitator should be able to “assign questions and work orders individually” by means of a collaboratively shared task list. Supporting the assignment and handling of tasks is closely related to functionalities which foster the participant's awareness of the current state of the collaborative process in which they are involved. Furthermore, the facilitator asked for a means to support synchronous voting in order to speed up the process by which participants reach a group decision.

3.2 Case study on computer-supported synchronous facilitation

Based on the initial CSCL-system the KOLUMBUS Chat was developed with a facilitated and a non-facilitated mode. Following the concept of KOLUMBUS, a chat is represented as an item and can be added at every position in the content structure. When starting the chat item in the integrated view a chat window opens (see figure 3). In the following basic features of the facilitated chat are presented
since it is more complex than the non-facilitated chat and offers more functionality (for more details see (Kienle, 2007)). Facilitator’s contributions are highlighted by a background color in the message window in order to direct attention of the participants to the facilitator’s inputs. As in most chat systems a list of participants (here at the right side) is available. Different icons indicate the status of the members (typing, having the floor etc.). The floor is given by the facilitator.

The list of topics supports the integration of material and synchronous communication as well as the later integration of the chat contributions into the integrated KOLUMBUS 2 content structure. Topics can be text (realized) and (in a conceptual status) links to other material sections. The topics are not only part of the content structure of KOLUMBUS2 but also used during the chatting step to structure the discussion process. The list of topics is a functionality that supports the facilitator.

In the facilitated chat participants have to request the floor and the facilitator is able to give the floor to one or more participants. Each user has – independent of the floor – the possibility to type up to three messages and store it in the clipboard at the bottom of the chat window. Before sending to the audience a user takes a prepared message from the clipboard to the input box, edits it if necessary and sends it to the others.

Participants can explicit refer to an existing contribution by clicking on the accordant message and compose the own message in the input box. References are indicated by an arrow in front of the message. The arrow is a tool tip that shows the referenced message when moving the cursor on it. The explicit reference also has an effect on the later permanent storage of the chat contributions. References are a functionality to reduce chat confusion. When a chat is finished the chat contributions are inserted in the integrated content structure of KOLUMBUS. For details concerning the integration see (Kienle, 2009).
For synchronous facilitation KOLUMBUS offers functionalities for the preparation as well as the guidance of the chat. To support the preparation and pre-structuring of a chat discussion the list of topic (as described above) is offered that is defined by the facilitator before the chat starts. During the chat the facilitator is able to choose a topic (by clicking on it) that is then placed in the headline of the chat. When changing the topic a contribution in the message window is generated by the system in order to direct attention on it.

In facilitated chats the facilitator gives or deletes the floor to one or more participants. Therefore two ways are offered (see figure 4): the facilitator can choose members from the participants list (A1 in figure 4) and give or delete the floor for them (A2). The second way takes request of participants into account: the facilitator has an overview list of the participants who requested the floor (B1) and he can use this list to choose members and confirm their requests (B2). The design of requesting the floor is inspired by the strategy of raising hands in face-to-face settings.
3.2.1 Setting and methods of the study

The aim of the study was to learn about the facilitation strategies and the computer support in synchronous settings. With respect to the facilitation strategies for preparing, guiding and summarizing the chats were analyzed. With respect to the technical support the usage of the functionalities supporting the facilitator was evaluated.

Facilitated chats were used and analyzed in a seminar at the University of Dortmund (Germany), Education Institute, during the winter term 2004/2005. Fifteen students which formed four subgroups of three to four students participated in the seminar. The seminar was carefully prepared as a blended learning seminar that combined work on given learning material from digital libraries and the elaboration and discussion of the results of the subgroups in facilitated seminar chats and face-to-face meetings of the whole group. The overall topic of the seminar was the potential of e-learning for the support of learning at universities and at the workplace. Each subgroup had to work on a preparation of a facilitated seminar chat and a talk that had to be given in one of the face-to-face meetings.

The whole group met in a rhythm of two weeks rotational in facilitated chats and face-to-face meetings. The chats prepared by a subgroup dealt with the chosen topic of the concerning subgroup and should give a feeling for the problem to the whole group. Furthermore the facilitated chat was before the presentation of the
subgroup so that the content of the chat had to be reflected for the concluding talk. In both, the facilitated seminar chats and the face-to-face meetings, a common sense for problems and solutions should be found. The facilitation was done by members of the student groups, each of these chats lasted 45 minutes. One exception was the first chat that was facilitated by the tutor of the seminar: it had duration of 90 minutes and dealt with an overview of the content of the seminar.

For the collection and analysis of data a mix of quantitative and qualitative methods was used. The analysis of the chats were done with Chatline (Holmer et al., 2006) that enables a post coding (e.g. the relation of chat contributions to a discussion thread) of a chat transcript and allows its analysis concerning different measures and patterns like for example person-related analysis or the occurrence of (parallel) discussion threads as well as graphical representations of the results. For this analysis the five seminar chats were post-referenced by two independent experts in order to mine discussion threads.

The qualitative part of the study mainly based on group interviews of the student group after each face-to-face meeting and a closing interview at the end of the seminar. The interviews are recorded, typed and analyzed in order to add reasons to the quantitative findings and evaluate the concepts of KOLUMBUS and the seminar.

3.2.2 Results concerning technical features and their usage

The results are presented here as a combination of technical features and their usage because usage of technical features in synchronous settings has an immediate influence on the development of the chat and the intervention of the facilitator.

The study showed, that the facilitators in the various chat used the floor control to a different extends; the part of participants who have the floor varied from one person (8 %) to all participants (100 %), the average per chat between 27 % and 41.5 % of all participants. No coherence was found between the number of participants who has the floor and the initiation of discussion threads by participants. This made clear that the floor control is not the only factor for the success of a synchronous facilitation. In fact the chat was ranked highest, where the facilitator used a combination of extensive usage of floor control and a high amount of own starting theses for discussions (as one way to fulfill the task initiating as proposed in the model of triadic communication).

Regarding the communication process it was found that the usage of floor control was not used to that extend we expected. Only in a few situations the floor of participants was deleted in order to draw attention on the change of the topic, an initial contribution or a conclusion by the facilitator. Facilitators mentioned an excessive demand in the simultaneous content-related guidance by formulating own statements and the usage of floor control. An improvement was achieved in these chats where the content-related and the organizational guidance was shared by two facilitators.
4. Design principles for the facilitation within CSCL

The studies showed insights about the facilitation strategies and technical features that support the facilitation. They confirmed that guidance of computer supported collaborative learning by a facilitator is especially requested in processes of discursive learning. The guidance of the communication process by a facilitator can lead to high participation, focused discussions and results agreed in the group.

With respect to computer-supported discursive learning at the workplace (like drafted at the beginning of section 3) a facilitation of the learning processes can benefit from these findings: more knowledge of the participants is involved and shared (as a result of higher participation), communication about the topic of interest (as a result of focused discussion) and a results that is accepted by the group of participants. Whatever the topic of the CSCL situation is (in section 3 the examples methods and products are mentioned) a facilitation might lead to better results in shorter time.

The studies showed first results on the technical features as well as on the facilitation strategies. In this section the main results are summarized in form of design principles and an extended model of triadic communication. These findings can be used by others as a framework for the design of own CSCL-systems that support facilitation and as a background for planning own facilitated processes.

<table>
<thead>
<tr>
<th>Design principle</th>
<th>Impacts for the communication process</th>
<th>Setting</th>
<th>Example for realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlight contributions of the facilitator</td>
<td>Draw attention on the contributions of the facilitator</td>
<td>Asynchronous and synchronous</td>
<td>Highlighting by color or boldface</td>
</tr>
<tr>
<td>Artifacts for pre-structuring the communication process</td>
<td>Focus on the content of (parts of the) discussion</td>
<td>Synchronous, facilitated group discussions</td>
<td>List of topics</td>
</tr>
<tr>
<td>Give and delete request to contribute</td>
<td>Draw attention, organizing discussion process</td>
<td>Synchronous, facilitated group discussions</td>
<td>Floor control</td>
</tr>
<tr>
<td>Highlight (parts of) contributions</td>
<td>Activate and compact discussions</td>
<td>Asynchronous, facilitated group discussions</td>
<td>Marker</td>
</tr>
<tr>
<td>Link of contributions</td>
<td>Create synergy by mining parallel discussions</td>
<td>Asynchronous, facilitated group discussions</td>
<td>Links/References</td>
</tr>
</tbody>
</table>

Table 1: Principles for the design of computer-supported facilitation
These design principles can be reflected and integrated in the light of the model of triadic communication. Figure 5 shows the model that combines the tasks of a facilitator and the technical features. It emphasizes that the design for facilitation support is a development of tasks of a role, technical features and their interference in the tradition of socio-technical design.

Figure 5: Design principles in the triadic model of communication

5. Conclusion and further research

This chapter dealt with the role of communication and facilitation for CSCL at the workplace. Communication was presented as an integral part of CSCL since direct experience of a situation and learning by observation are mostly inapplicable in distance learning. To guide the process of communication a facilitator can be helpful. Based on related work on the facilitation of face-to-face and computer-supported communication a model of triadic communication was developed that focuses on the tasks of a facilitator. For these tasks technical support within a CSCL-system are developed and analyzed in two cases studies.

The study on the facilitation in asynchronous settings provided first insights on the impact of the different strategies and functionalities employed to support facilitation. For example, if the facilitator used instructive wording when formulating his contributions and appoints deadlines for the completion of tasks, participation initially increased. However, this was not sufficient to foster the development of mutually agreed upon results, e.g. a task list or an outline of an article that had to be written collaboratively. Findings from the case study suggest
that for this purpose a moderator occasionally has to make decisions on their own and needs to present intermediary results in condensed form. Compared to face-to-face situations, a facilitator is to a greater extent involved in activities concerning decision making and leadership taking when moderating asynchronous computer supported discussions.

The study on the facilitation in synchronous settings also revealed results on the technical features as well as the strategies of facilitation. It was found that floor control as a single functionality does not seem to be an appropriate vehicle to guide the discussion. A sufficient strategy for facilitation was achieved by an appropriate combination of starting discussion threads, using the list of topics and floor control.

From the results of the two studies generic design principles for the facilitation of communication within CSCL at the workplace are derived and integrated on the model of triadic communication. This final model emphasizes that the design for facilitation support is a development of tasks of a role, technical features and their interference in the tradition of socio-technical design.

The facilitation strategies and design principles are first steps in the field of facilitation of CSCL. Further research and studies have to be conducted in order to get a resilient fundament for the socio-technical design of computer-supported facilitation.

The results reported here give valuable hints for settings of CSCL at work, especially in cases of evolving and mining new knowledge in the company. Whenever bringing a group of learners together it is required that a facilitator prepares, guides and summarizes the group discussion as described in this chapter in order to increase the effectiveness of the discussion. For the designers of technical systems for CSCL at work functionalities for the support of a facilitator should be added (like shown in table 1) in order offer appropriate support for the facilitators of communication processes within CSCL at work.

References


